

WHAT IS CLAIMED IS:

1. A liquid crystal display (LCD) device, comprising:

an LCD panel having a plurality of data lines;

a control chip;

a sampling switch array coupled to the data lines and the control chip, wherein the control chip applies video signals to the data lines via the sampling switch array; and

a switch controller coupled to the sampling switch array and the control chip, wherein the switch controller controls the sampling switch array in accordance with a polarity of the video signals applied from the control chip.

2. The liquid crystal display device according to claim 1, wherein the control chip includes a plurality of data supply lines, wherein the plurality of data supply lines transmit m number of video signals between the switch controller and the sampling switch array, wherein m is an even integer greater than 1.

3. The liquid crystal display device according to claim 2, wherein the sampling switch array includes a plurality of switching blocks connected to a corresponding one of the plurality of data supply lines, wherein each of the switching blocks includes m number of switching devices, and wherein the each of the switching devices divides the m number of

video signals and applies the divided video signals to the plurality of data lines.

4. The liquid crystal display device according to claim 3, wherein the switch controller sequentially turns the switching devices on, wherein the video signals are applied to the switching devices that are turned on.

5. The liquid crystal display device according to claim 4, wherein the switch controller alternately applies a first turn-on pulse having a first absolute voltage value and a second turn-on pulse having a second absolute voltage value different from the first absolute voltage value, wherein the switching devices in receipt of the first and second turn-on pulses are turned on.

6. The liquid crystal display device according to claim 5, wherein
the switching devices comprise PMOS transistors;
the switching controller applies the first turn-on pulse to the switching devices upon receipt of a video signal having a positive polarity; and
the switching controller applies the second turn-on pulse to the switching devices upon receipt of a video signal having a negative polarity.

7. The liquid crystal display device according to claim 6, wherein

the first turn-on pulse comprises a voltage drop from a first voltage value to a second voltage value, wherein the first voltage value has a positive polarity and the second voltage value has a negative polarity; and

the second turn-on pulse comprises a voltage drop from the first voltage value to a third voltage value, wherein the third voltage value has a negative polarity, and wherein an absolute value of the third voltage value is greater than an absolute voltage value of the second voltage value.

8. The liquid crystal display device according to claim 7, wherein the switch controller includes m number of pulse suppliers, wherein the pulse suppliers selectively apply first and second turn-on pulses to each of the m switching devices.

9. The liquid crystal display device according to claim 8, wherein each of the pulse suppliers includes:

a first level shifter that generates the first turn-on pulse via the first and second voltage values;

a second level shifter that generates the second turn-on pulse via the first and third voltage values;

a comparator that compares a voltage value of a common voltage with a voltage value of the video signal; and

a selector that applies one of the first and second turn-on pulses to the switching devices in accordance with a selection signal output by the comparator.

10. The liquid crystal display device according to claim 9, wherein
the comparator applies a first selection signal to the selector when the voltage value of the video signal is greater than the voltage value of the common voltage; and
the comparator applies a second selection signal to the selector when the voltage value of the video signal is less than the voltage value of the common voltage.

11. The liquid crystal display device according to claim 10, wherein
the selector applies the first turn-on pulse when the output selection signal comprises the first selection signal; and
the selector applies the second turn-on pulse when the output selection signal comprises the second selection signal.

12. The liquid crystal display device according to claim 1, wherein the switch controller is arranged within the LCD panel.

13. The liquid crystal display device according to claim 1, wherein the switch controller is arranged within a printed circuit board.

14. The liquid crystal display device according to claim 9, wherein the selector is arranged within the LCD panel; and the comparator, the first level shifter, and the second level shifter are arranged within a PCB.

15. The liquid crystal display device according to claim 8, wherein each of the pulse suppliers includes:

a comparator that compares a voltage value of a common voltage with a voltage value of the video signal;

a selector that receives the second and third voltage values and that applies one of the second and third voltage values in accordance with a selection signal output by the comparator; and

a level shifter that receives the first voltage value and that applies one of the first and second turn-on pulses to the switching devices and the voltage value applied by the selector.

16. The liquid crystal display device according to claim 15, wherein the comparator applies a first selection signal to the selector when the voltage value of the video signal is greater than the voltage value of the common voltage; and the comparator applies a second selection signal to the selector when the voltage

value of the video signal is less than the voltage value of the common voltage.

17. The liquid crystal display device according to claim 16, wherein
the selector applies the second voltage value when the output selection signal
comprises the first selection signal; and
the selector applies the third voltage value when the output selection signal comprises
the second selection signal.

18. The liquid crystal display device according to claim 17, wherein
the level shifter applies the first turn-on pulse when the voltage value applied by the
selector comprises the second voltage value; and
the level shifter applies the second turn-on pulse when the voltage value applied by
the selector comprises the third voltage value.

19. The liquid crystal display device according to claim 5, wherein
the switching devices comprise NMOS transistors;
the switching controller applies the first turn-on pulse to the switching devices upon
receipt of a video signal having a positive polarity; and
the switching controller applies the second turn-on pulse to the switching devices
upon receipt of a video signal having a negative polarity.

20. The liquid crystal display device according to claim 19, wherein the first turn-on pulse comprises a voltage rise from a first voltage value to a second voltage value, wherein the first voltage value has a negative polarity and the second voltage value has a positive polarity; and the second turn-on pulse comprises a voltage rise from the first voltage value to a third voltage value, wherein the third voltage value has a positive polarity, and wherein an absolute value of the third voltage value is less than an absolute voltage value of the second voltage value.

21. The liquid crystal display device according to claim 20, wherein the switch controller includes m number of pulse suppliers, wherein the pulse suppliers selectively apply first and second turn-on pulses to each of the m switching devices.

22. The liquid crystal display device according to claim 21, wherein each of the pulse suppliers includes:

a first level shifter that generates the first turn-on pulse via the first and second voltage values;

a second level shifter that generates the second turn-on pulse via the first and third voltages values;

a comparator that compares a voltage value of a common voltage with a voltage value of the video signal; and

a selector that applies one of the first and second turn-on pulses to the switching devices in accordance with a selection signal output by the comparator

23. The liquid crystal display device according to claim 22, wherein
the comparator applies a first selection signal to the selector when the voltage value of the video signal is greater than the voltage value of common voltage; and
the comparator applies a second selection signal to the selector when the voltage value of the video signal is less than the voltage value of the common voltage.

24. The liquid crystal display device according to claim 23, wherein
the selector applies the first turn-on pulse when the output selection signal comprises the first selection signal; and
the selector applies the second turn-on pulse when the output selection signal comprises the second selection signal.

25. The liquid crystal display device according to claim 21, wherein each of the pulse suppliers includes:

a comparator that compares a voltage value of a common voltage with a voltage

value of the video signal;

a selector that receives the second and third voltage values and for applying one of the second and third voltage values in accordance with a selection signal output by the comparator; and

a level shifter that receives the first voltage value and for applying one of the first and second turn-on pulses to the switching devices and the voltage value applied by the selector.

26. The liquid crystal display device according to claim 25, wherein
the comparator applies a first selection signal to the selector when the voltage value of the video signal is greater than the voltage value of the common voltage; and
the comparator a second selection signal to the selector when the voltage value of the video signal is less than the voltage value of the common voltage.

27. The liquid crystal display device according to claim 26, wherein
the selector applies the second voltage value when the output selection signal comprises the first selection signal; and
the selector applies the third voltage value when the output selection signal comprises the second selection signal.

28. The liquid crystal display device according to claim 27, wherein
the level shifter applies the first turn-on pulse when the voltage value applied by the selector comprises the second voltage value; and
the level shifter applies the second turn-on pulse when the voltage value applied by the selector comprises the third voltage value.

29. A method of driving a liquid crystal display (LCD) device, comprising:
applying m number of video signals to a plurality of switching blocks each connected to a plurality of data lines via switches, wherein m represents an even integer greater than 1; and
alternately applying a first turn-on pulse and a second turn-on pulse to the switches, wherein the switches are sequentially turned on, wherein the first and second turn-on pulses have different absolute voltage values, and wherein the video signals are applicable to data lines connected to turned-on switches.

30. The method according to claim 29, wherein
the switches comprise PMOS transistors;
the first turn-on pulse comprises a voltage drop from a first voltage value to a second voltage value, wherein the first voltage value has a positive polarity and the second voltage value has a negative polarity; and

the second turn-on pulse comprises a voltage drop from the first voltage value to a third voltage value, wherein the third voltage value has a negative polarity, and wherein an absolute value of the third voltage value is greater than an absolute value of the second voltage value.

31. The method according to claim 30, wherein

the first turn-on pulse is applied to the switches upon receipt of a positive video signal by the switches; and

the second turn-on pulse is applied to the switches upon receipt of a negative video signal by the switches.

32. The method according to claim 29, wherein

the switches comprise NMOS transistors;

the first turn-on pulse comprises a voltage rise from a first voltage value to a second voltage value, wherein the first voltage value has a negative polarity and the second voltage value has a positive polarity; and

the second turn-on pulse comprises a voltage rise from the first voltage value to a third voltage value, wherein the third voltage value has a positive polarity, and wherein an absolute value of the third voltage value is less than an absolute value of the second voltage value.

33. The method according to claim 32, wherein

the first turn-on pulse is applied to the switches upon receipt of a negative video signal by the switches; and

the second turn-on pulse is applied to the switches upon receipt of a positive video signal by the switches.